

Term Information

Effective Term Autumn 2018
Previous Value Summer 2012

Course Change Information

What change is being proposed? (If more than one, what changes are being proposed?)

To add the option for an online version of the course. In-person delivery will continue to be offered as it has been.

What is the rationale for the proposed change(s)?

To maximize flexibility for students while continuing to offer the same content in different formats.

What are the programmatic implications of the proposed change(s)?

(e.g. program requirements to be added or removed, changes to be made in available resources, effect on other programs that use the course)?

None

Is approval of the request contingent upon the approval of other course or curricular program request? No

Is this a request to withdraw the course? No

General Information

Course Bulletin Listing/Subject Area	Earth Sciences
Fiscal Unit/Academic Org	School of Earth Sciences - D0656
College/Academic Group	Arts and Sciences
Level/Career	Undergraduate
Course Number/Catalog	2204
Course Title	Exploring Water Issues
Transcript Abbreviation	Explr Water Issues
Course Description	Water on Earth, human impacts, and scientific and technological issues related to water resource development and conservation.
Semester Credit Hours/Units	Fixed: 3

Offering Information

Length Of Course	14 Week, 12 Week, 8 Week, 7 Week, 6 Week
Flexibly Scheduled Course	Sometimes
Does any section of this course have a distance education component?	Yes
Is any section of the course offered	100% at a distance
<i>Previous Value</i>	<i>No</i>
Grading Basis	Letter Grade
Repeatable	No
Course Components	Lecture
Grade Roster Component	Lecture
Credit Available by Exam	No
Admission Condition Course	Yes
Admission Condition	Natural Science
Off Campus	Never
Campus of Offering	Columbus, Lima, Mansfield, Marion, Newark

Prerequisites and Exclusions

Prerequisites/Corequisites

Exclusions

Not open to students with credit for EarthSci 204 or GeolSci 204.

Electronically Enforced

No

Cross-Listings

Cross-Listings

Subject/CIP Code

Subject/CIP Code

40.0605

Subsidy Level

Baccalaureate Course

Intended Rank

Freshman, Sophomore, Junior, Senior

Requirement/Elective Designation

Required for this unit's degrees, majors, and/or minors

General Education course:

Physical Science

The course is an elective (for this or other units) or is a service course for other units

Course Details

Course goals or learning objectives/outcomes

- Processes controlling the movement of surface & ground water, the distribution of water resources, ways in which resources are exploited and/or contaminated, critical issues concerning the use of water in the US & countries around the world

Previous Value

Content Topic List

- Crisis in the world water supply
- Re-shaping the natural world
- Water health
- Water usage, abuses, and management
- Water conflicts

Sought Concurrence

No

Attachments

- syllabus_online_es2204.pdf: Online syllabus
(Syllabus. Owner: Panero, Wendy R)
- Earth Sciences 2204 Ibaraki (5).pdf: ASC Tech approval
(Other Supporting Documentation. Owner: Panero, Wendy R)
- 2204syllabus_fall_2017.fws.pdf: in person syllabus
(Syllabus. Owner: Panero, Wendy R)
- GECAssessment2204.doc: GE Assessment Plan
(GEC Course Assessment Plan. Owner: Panero, Wendy R)

Comments

- GE assessment plan now included. *(by Panero,Wendy R on 03/21/2018 12:41 PM)*
- Please upload GE assessment plan for the distance learning course. *(by Vankeerbergen,Bernadette Chantal on 02/07/2018 01:01 PM)*

Workflow Information

Status	User(s)	Date/Time	Step
Submitted	Panero,Wendy R	01/29/2018 01:32 PM	Submitted for Approval
Approved	Panero,Wendy R	01/29/2018 01:32 PM	Unit Approval
Approved	Haddad,Deborah Moore	02/04/2018 01:34 PM	College Approval
Revision Requested	Vankeerbergen,Bernadette Chantal	02/07/2018 01:01 PM	ASCCAO Approval
Submitted	Panero,Wendy R	03/21/2018 12:41 PM	Submitted for Approval
Approved	Panero,Wendy R	03/21/2018 12:42 PM	Unit Approval
Approved	Haddad,Deborah Moore	03/21/2018 12:55 PM	College Approval
Pending Approval	Nolen,Dawn Vankeerbergen,Bernadette Chantal Oldroyd,Shelby Quinn Hanlin,Deborah Kay Jenkins,Mary Ellen Bigler	03/21/2018 12:55 PM	ASCCAO Approval



SYLLABUS: EARTH SCI 2204 EXPLORING WATER ISSUES FALL 2018

Course overview

Instructor

Instructor: Motomu Ibaraki

Email address: ibaraki.1@osu.edu

Phone number: 614-292-7528

Office: ML 0229

Office hours

(in person): please access <http://ibaraki.youcanbook.me> to book an appointment; (online):
carmen connect <http://carmenconnect.osu.edu/ibaraki-office-hour/>

Public Health Specialization Competencies

Please review the BSPH core and specialization competencies addressed by this course at the following link: <http://cph.osu.edu/students/undergraduate>

Course description

Introduction to issues affecting the world's fresh water supply with an emphasis on water use, conflict and sustainability. Lectures are given through a mixture of ways including recordings, videos, and pdfs (lecture slides).

Course objectives

The objectives of this course are:

1. to introduce basic concepts controlling the movement of surface water and ground water, the distribution of water resources, the ways in which these resources can be exploited and/or contaminated, and
2. to examine critical issues concerned with the use of water in the United States and countries around the world

GE Category and Expected learning outcomes

This course fulfills GE Category Natural Science, Physical Science. Natural Science coursework enables students to understand the principles, theories, and methods of modern science, the relationship between science and technology, the implications of scientific discoveries and the potential of science and technology to address problems of the contemporary world.

1. Students understand the basic facts, principles, theories and methods of modern science.
2. Students learn key events in the development of science and recognize that science is an evolving body of knowledge.
3. Students describe the inter-dependence of scientific and technological developments.
4. Students recognize social and philosophical implications of scientific discoveries and understand the potential of science and technology to address problems of the contemporary world.

Course materials

Optional materials

Cech, T.V, 2002. Principles of Water Resources: History, Development, Management, and Policy, Wiley Text Books, p480. (ISBN: 0471438618) (print)

Hornberger, G. M. J.P. Raffensperger, P.L. Wiberg, and K.N. Eshleman, 1998. Elements of Physical Hydrology: Johns Hopkins University Press, Baltimore, Maryland, 314 p. (print)

Clarke, R. and J. King, 2004. The water atlas, New Press, p127. (ISBN: 1565849078) (print)

Course technology

For help with your password, university e-mail, Carmen, or any other technology issues, questions, or requests, contact the OSU IT Service Desk. Standard support hours are available at <https://ocio.osu.edu/help/hours>, and support for urgent issues is available 24x7.

- **Self-Service and Chat support:** <http://ocio.osu.edu/selfservice>
- **Phone:** 614-688-HELP (4357)
- **Email:** 8help@osu.edu
- **TDD:** 614-688-8743

Baseline technical skills necessary for online courses

- Basic computer and web-browsing skills
- Navigating Carmen

Technology skills necessary for this specific course

- CarmenConnect text, audio, and video chat
- Collaborating in CarmenWiki
- Recording a slide presentation with audio narration
- Recording, editing, and uploading video

Necessary equipment

- Computer: current Mac (OS X) or PC (Windows 7+) with high-speed internet connection
- Webcam: built-in or external webcam, fully installed
- Microphone: built-in laptop or tablet mic or external microphone

Necessary software

- [Microsoft Office 365 ProPlus](#) All Ohio State students are now eligible for free Microsoft Office 365 ProPlus through Microsoft's Student Advantage program. Each student can install Office on five PCs or Macs, five tablets (Windows, iPad® and Android™) and five phones.
 - Students are able to access Word, Excel, PowerPoint, Outlook and other programs, depending on platform. Users will also receive 1 TB of OneDrive for Business storage.
 - Office 365 is installed within your BuckeyeMail account. Full instructions for downloading and installation can be found <https://ocio.osu.edu/kb04733>.

Grading and faculty response

Grades

Assignment or category	Points
Two midterms (80 min, multiple-choices, calculations, and short answers)	40
Final exam (80 min, multiple-choices, calculations, and short answers)	20
Assignments (calculations, and short answers)	15
Individual presentation	10

(Powerpoint slide w/o audio)	
14 timed quizzes (30 min, 15 questions)	15
Total	100

Exams cover material presented in class, assignments, media presentations, and any other material covered in class.

See course schedule, below, for due dates

Late Submission Policies

All graded assignments are due on the specified due date. No emailed assignments will be accepted. All assignments turned in after the due date will incur a 10% penalty for each day late, up to a week late. After that no points will be awarded to the assignment. If a doctor's excuse for illness or excuse for a university-sanctioned event is provided accommodations will be made. Make-up assignments and exams will not be given unless a valid excuse is provided.

Grading scale

Grade	Percent		
A	93	-	100
A-	90	-	92
B+	87	-	89
B	83	-	86
B-	80	-	82
C+	77	-	79
C	73	-	76
C-	70	-	72
D+	67	-	69
D	60	-	66
E	59 and below		

Faculty feedback and response time

I am providing the following list to give you an idea of my intended availability throughout the course. (Remember that you can call **614-688-HELP** at any time if you have a technical problem.)

Grading and feedback

For large weekly assignments, you can generally expect feedback within **7 days**.

E-mail

I will reply to e-mails within **24 hours on school days**.

Discussion board

I will check and reply to messages in the discussion boards every **24 hours on school days**.

Attendance, participation, and discussions

Student participation requirements

Because this is a distance-education course, your attendance is based on your online activity and participation. The following is a summary of everyone's expected participation:

- **Logging in: AT LEAST ONCE PER WEEK**
Be sure you are logging in to the course in Carmen each week, including weeks with holidays or weeks with minimal online course activity. (During most weeks you will probably log in many times.) If you have a situation that might cause you to miss an entire week of class, discuss it with me *as soon as possible*.
- **Office hours and live sessions: OPTIONAL OR FLEXIBLE**
All live, scheduled events for the course, including my office hours, are optional. If you are required to discuss an assignment with me, please contact me at the beginning of the week if you need a time outside my scheduled office hours.
- **Participating in discussion forums: 4+ TIMES PER WEEK**
As participation, each week you can expect to post at least four times as part of our substantive class discussion on the week's topics.

Discussion and communication guidelines

The following are my expectations for how we should communicate as a class. Above all, please remember to be respectful and thoughtful.

- **Writing style:** While there is no need to participate in class discussions as if you were writing a research paper, you should remember to write using good grammar, spelling, and punctuation. Informality (including an occasional emoticon) is fine for non-academic topics.
- **Tone and civility:** Let's maintain a supportive learning community where everyone feels safe and where people can disagree amicably. Remember that sarcasm doesn't always come across online.

- **Citing your sources:** When we have academic discussions, please cite your sources to back up what you say. (For the textbook or other course materials, list at least the title and page numbers. For online sources, include a link.)
- **Backing up your work:** Consider composing your academic posts in a word processor, where you can save your work, and then copying into the Carmen discussion.

Other course policies

Academic integrity policy

Policies for this online course

- **Quizzes and exams:** You must complete the midterm and final exams yourself, without any external help or communication. Weekly quizzes are included as self-checks.
- **Written assignments:** Your written assignments, including discussion posts, should be your own original work. In formal assignments, you should follow **MLA** style to cite the ideas and words of your research sources. You are encouraged to ask a trusted person to proofread your assignments before you turn them in--but no one else should revise or rewrite your work.
- **Reusing past work:** In general, you are prohibited in university courses from turning in work from a past class to your current class, even if you modify it. If you want to build on past research or revisit a topic you've explored in previous courses, please discuss the situation with me.
- **Falsifying research or results:** All research you will conduct in this course is intended to be a learning experience; you should never feel tempted to make your results or your library research look more successful than it was.
- **Collaboration and informal peer-review:** The course includes many opportunities for formal collaboration with your classmates. While study groups and peer-review of major written projects is encouraged, remember that comparing answers on a quiz or assignment is not permitted. If you're unsure about a particular situation, please feel free just to ask ahead of time.

Ohio State's academic integrity policy

Academic integrity is essential to maintaining an environment that fosters excellence in teaching, research, and other educational and scholarly activities. Thus, The Ohio State University and the Committee on Academic Misconduct (COAM) expect that all students have read and understand the University's *Code of Student Conduct*, and that all students will complete all academic and scholarly assignments with fairness and honesty. Students must recognize that failure to follow the rules and guidelines established in the University's *Code of Student Conduct* and this syllabus may constitute "Academic Misconduct."

The Ohio State University's *Code of Student Conduct* (Section 3335-23-04) defines academic misconduct as: "Any activity that tends to compromise the academic integrity of the University, or subvert the educational process." Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination. Ignorance of the University's *Code of Student Conduct* is never considered an "excuse" for academic misconduct, so I recommend that you review the *Code of Student Conduct* and, specifically, the sections dealing with academic misconduct.

If I suspect that a student has committed academic misconduct in this course, I am obligated by University Rules to report my suspicions to the Committee on Academic Misconduct. If COAM determines that you have violated the University's *Code of Student Conduct* (i.e., committed academic misconduct), the sanctions for the misconduct could include a failing grade in this course and suspension or dismissal from the University.

If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact me.

Other sources of information on academic misconduct (integrity) to which you can refer include:

- The Committee on Academic Misconduct web pages ([COAM Home](#))
- *Ten Suggestions for Preserving Academic Integrity* ([Ten Suggestions](#))
- *Eight Cardinal Rules of Academic Integrity* (www.northwestern.edu/uacc/8cards.htm)

Copyright disclaimer

The materials used in connection with this course may be subject to copyright protection and are only for the use of students officially enrolled in the course for the educational purposes associated with the course. Copyright law must be considered before copying, retaining, or disseminating materials outside of the course.

Trigger warning

Some contents of this course may involve media that may be triggering to some students due to descriptions of and/or scenes depicting acts of violence, acts of war, or sexual violence and its aftermath. If needed, please take care of yourself while watching/reading this material (leaving classroom to take a water/bathroom break, debriefing with a friend, contacting a Sexual Violence Support Coordinator at 614-292-1111, or Counseling and Consultation Services at 614-292-5766, and contacting the instructor if needed). Expectations are that we all will be respectful of our classmates while consuming this media and that we will create a safe space for each other. Failure to show respect to each other may result in dismissal from the class.

Statement on title IX

Title IX makes it clear that violence and harassment based on sex and gender are Civil Rights offenses subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories (e.g., race). If you or someone you know has been sexually harassed or assaulted, you may find the appropriate resources at <http://titleix.osu.edu> or by contacting the Ohio State Title IX Coordinator, Kellie Brennan, at titleix@osu.edu

Accessibility accommodations for students with disabilities

Requesting accommodations

Students with disabilities (including mental health, chronic or temporary medical conditions) that have been certified by the Office of Student Life Disability Services will be appropriately accommodated and should inform the instructor as soon as possible of their needs. The Office of Student Life Disability Services is located in 098 Baker Hall, 113 W. 12th Avenue; telephone 614- 292-3307, slds@osu.edu; slds.osu.edu

Accessibility of course technology

This online course requires use of Carmen (Ohio State's learning management system) and other online communication and multimedia tools. If you need additional services to use these technologies, please request accommodations with your instructor.

- [Carmen \(Canvas\) accessibility](#)
- Streaming audio and video
- Synchronous course tools

Your mental health!

A recent American College Health Survey found stress, sleep problems, anxiety, depression, interpersonal concerns, death of a significant other and alcohol use among the top ten health impediments to academic performance. Students experiencing personal problems or situational crises during the quarter are encouraged to contact the College of Pharmacy Office of Student Services in room 150 Parks Hall (614-292-5001) OR OSU Counseling and Consultation Services (614-292-5766) for assistance, support and advocacy. This service is free and confidential.

Academic Support Services

Student Services

For other academic matters the Student Service Center <http://ssc.osu.edu/> can help with a range of issues related to paying tuition and fees, track financial aid, register for classes, view your grades, get important updates and much more.

Student Academic Services

Undergraduate academic advising at Ohio State (Columbus campus) is provided by the colleges and/or the departments that offer the programs—the degree(s), the major(s), the minor(s)—a student is pursuing. Therefore, where a student should go to seek academic advice will vary by student and by academic program. The details of the student academic services offered on the OSU main campus can be found at <http://advising.osu.edu/welcome.shtml>.

Course schedule (tentative)

Week	Dates	Topics, Readings, Assignments, Deadlines
1	8/21 – 8/24	Course Introduction – Exploring Water Issues Quiz
2	8/27 – 8/31	Water Cycle Quiz
3	9/3 – 9/7	Crisis in the World Water Supply - Decline of the Aral Sea Assignment 1: due 9/10 Quiz Discussion board post: Aral sea
4	9/10 – 9/14	Ground Water – Introduction Quiz Midterm 1
5	9/17 – 9/21	Water Wells and Pumping Impacts Quiz
6	9/24 – 9/28	When Rivers Run Dry Assignment 2: due 10/1 Quiz Discussion board post: Colorado River problems
7	10/1 – 10/5	Evapotranspiration and Water Budget - High Plains Aquifer Quiz
8	10/8 – 10/12	Unsustainable agribusiness and Grandprairie Demonstration Project in Arkansas

		Individual presentation: due 10/15 Discussion board post: Grandprairie Demonstration Project (Autumn Break)
9	10/15 – 10/19	Floods - Examples from USA and Around the World Assignment 3: due 10/22 Quiz
10	10/22 – 10/26	Introduction to Water Pollution Quiz Midterm 2
11	10/29 – 11/2	Issues in Water Pollution – Movie “Civil Action” Quiz Discussion board post: Civil Action
12	11/5 – 11/9	Issues in Water Pollution – Energy and Shale Gas Quiz Assignment 4: due 11/12
13	11/12 – 11/16	Water and Health - Arsenic poisoning in Bangladesh Quiz Discussion board post: Bangladesh arsenic problem
14	11/19 – 11/23	Impacts of Climate Change (Thanksgiving Break)
15	11/26 – 11/30	Impacts of Climate Change, Water Business Quiz
16	12/3 – 12/5	Water Business Quiz 1 day

Arts and Sciences Distance Learning Course Component Technical Review Checklist

Course: Earth sciences 2204

Instructor: Motomu Ibaraki

Summary: Distance learning course offering (DL)

Standard - Course Technology	Yes	Yes with Revisions	No	Feedback/ Recomm.
6.1 The tools used in the course support the learning objectives and competencies.	✓			<p>The learning objectives and competencies are supported by the course tools used in this course in the following ways.</p> <ul style="list-style-type: none"> • Weekly readings • Weekly comprehension quizzes • Short answer/calculation assignments • Individual presentations • Discussion board posts
6.2 Course tools promote learner engagement and active learning.	✓			<p>Students will engage with the course materials and instructor on a weekly basis in the following ways to promote active learning.</p> <ul style="list-style-type: none"> • Carmen LMS • MS Office 365 (Student)
6.3 Technologies required in the course are readily obtainable.	✓			<p>All technologies being used for this course are readily obtainable through the Carmen LMS and/or a standard web browser.</p>
6.4 The course technologies are current.	✓			<p>All technologies being used for this course are current.</p>
6.5 Links are provided to privacy policies for all external tools required in the course.	✓			<p>A link to the privacy policy for the Carmen LMS has been included in the "Course technology" section of the syllabus.</p>
Standard - Learner Support				

7.1 The course instructions articulate or link to a clear description of the technical support offered and how to access it.	✓			A Link has been provided in the “Course technology section” of the syllabus for the technical support available for the Carmen LMS.
7.2 Course instructions articulate or link to the institution’s accessibility policies and services.	✓			a
7.3 Course instructions articulate or link to an explanation of how the institution’s academic support services and resources can help learners succeed in the course and how learners can obtain them.	✓			b
7.4 Course instructions articulate or link to an explanation of how the institution’s student services and resources can help learners succeed and how learners can obtain them.	✓			c
Standard – Accessibility and Usability				
8.1 Course navigation facilitates ease of use.	✓			Recommend using the Carmen Distance Learning “Master Course” template developed by ODEE and available in the Canvas Commons to provide student-users with a consistent user experience in terms of navigation and access to course content.
8.2 Information is provided about the accessibility of all technologies required in the course.	✓			A link has been provided for the accessibility information for the Carmen LMS.
8.3 The course provides alternative means of access to course materials in formats that meet the needs of diverse learners.	✓			Recommend that resources be developed to address any requests for alternative means of access to course materials. These resources should be in formats that meet the needs of diverse learners.
8.4 The course design facilitates readability	✓			Recommend using the Carmen Distance Learning “Master Course” template developed by ODEE and available in the Canvas Commons to provide student-users with a consistent user experience in terms of navigation and access to course content.

8.5 Course multimedia facilitate ease of use.	✓		All assignments and activities that use the Carmen LMS with embedded multimedia facilitates ease of use. All other multimedia resources facilitate ease of use by being available through a standard web browser.
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Reviewer Information

- Date reviewed: Mike Kaylor
- Reviewed by: 12/12/2017

Notes:

^aThe following statement about disability services (recommended 16 point font):
 Students with disabilities (including mental health, chronic or temporary medical conditions) that have been certified by the Office of Student Life Disability Services will be appropriately accommodated and should inform the instructor as soon as possible of their needs. The Office of Student Life Disability Services is located in 098 Baker Hall, 113 W. 12th Avenue; telephone 614- 292-3307, slds@osu.edu; slds.osu.edu.

^bAdd to the syllabus this link with an overview and contact information for the student academic services offered on the OSU main campus.
<http://advising.osu.edu/welcome.shtml>

^cAdd to the syllabus this link with an overview and contact information for student services offered on the OSU main campus. <http://ssc.osu.edu>. Also, consider including this link in the “Academic Support Services” section of the syllabus.

Exploring Water Issues (EARTHSCI 2204)

Dr. Frank Schwartz
227 Mendenhall Lab
schwartz.11@osu.edu (292-6196)

Description

Introduction to issues affecting the world's fresh water supply with an emphasis on water use, conflict and sustainability.

Course Objectives

The objectives of this course are:

- (1) to introduce basic concepts controlling the movement of surface water and ground water, the distribution of water resources, the ways in which these resources can be exploited and/or contaminated, and
- (2) to examine critical issues concerned with the use of water in the United States and countries around the world

Meeting Times

Tu Thur 11:10 am – 12:30 pm Mendenhall 191

Office Hours

Tu Thur 1:00 pm – 2:00 pm
Fri 10:00 am – 2:00 pm
Other email for appointment

Course Grades

The course will be graded according to results from examinations, assignments, and class project, as follows:

- | | | |
|-----|---------------------------|----------|
| (1) | Two midterm exams | 20%, 20% |
| (2) | Final exam | 30% |
| (3) | Periodic assignments/quiz | 10% |
| (4) | Class project | 15% |
| (5) | Attendance | 5% |

Each student's numerical grade will be determined as the sum of 1-5 out of 100%. The final letter grade will be based on the university standard scoring system. Typically, grades are curved.

Exam schedule

Midterm exam 1	Thur, Sept 21	class period
Midterm exam 2	Thur, Nov 2	class period
Final exam (sched)	Mon, Dec 11	12:00 pm – 1:45 pm

Policies on Attendance and Absences

Attendance is **required** at lecture sessions. Attendance will be spot checked for 5% grade. Please notify me of emergencies where students must miss class. Each student must meet individually with the instructor or GTA regarding make-up work for missed assignments.

Disability Services

Students with needs certified by the Office for Student Life Disability Services (SLDS) will be

appropriately accommodated. The Office for SLDS is located in 098 Baker Hall, 113 W. 12th Avenue (telephone 614-292-3307), slds@osu.edu.

Academic Misconduct

The Ohio State University and the Committee on Academic Misconduct (COAM) expect that all students will complete all academic and scholarly assignments with fairness and honesty. Failure to follow the rules and guidelines established in the University's *Code of Student Conduct and this syllabus* may constitute "Academic Misconduct".

The Ohio State University's Code of Student Conduct (Section 3335-23-04) defines academic misconduct as: "Any activity that tends to compromise the academic integrity of the University, or subvert the educational process". Examples of academic misconduct include plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination. All suspected cases of academic misconduct will be reported to the University Committee on Academic Misconduct. If academic misconduct has been committed, sanctions may be imposed by the university.

Late Submission Policies

All graded assignments are due on the specified due date. Assignments will be submitted via Carmen so that emailed assignments will not be accepted. There will be a short grace period after the due date. Once Carmen closes, no points will be awarded to the assignment. If a doctor's excuse for illness or excuse for a university-sanctioned event is provided accommodations will be made. Make-up assignments and exams will not be given unless a valid excuse is provided.

Topical Outline

The following is a tentative, chronological outline of course lecture and associated group or individual project and exercise topics:

Lecture notes can be downloaded from: Carmen

- Module 1: Course Introduction – Exploring Water Issues
- Module 2: Water Cycle
- Module 3: Ground Water - Introduction
- Module 4: Water Wells and Pumping Impacts
- Module 5: When Rivers Run Dry
- Module 6: Evapotranspiration and Water Budget - High Plains Aquifer
- Module 7: "Whisky's for drinkin – water's for fightin' over"
- Module 8: Floods - Examples from USA and Around the World
- Module 9: Flood Control - Big things and little things
- Module 10: Droughts - Anasazi and Mayan collapse
- Module 11: Introduction to Water Pollution
- Module 12: Issues in Water Pollution
- Module 13: Issues Continued -Solid Liquid Waste Disposal
- Module 14: Issues in Water Pollution – Energy and Shale Gas
- Module 15: Desertification in Africa and China
- Module 16: Water and Health
- Module 17: Impacts of Climate Change

Assignments and Grand Prairie Class Project:

- Assignment #1: Reading and discussion of *Groundwater a Resource in Decline* – Due: Aug 31
- Assignment #2: *High Plains Aquifer* – Due: Sept 7
- Assignment #3: Collapse Video – Due: Sept 28

Assignment #4: Reading and Essay “*Bitter Waters*” – Due: Oct 10

Megacities – Exercise 1 – Due: Oct 17

Megacities – Exercise 2 – Due: Oct 24

Megacities – Exercise 3 – Due: Nov 9

Assignment #5: Reading and discussion “*Australia’s Dry Run*” – Due: Nov 16

Educational Goals and Learning Outcomes

Natural Science

Goals

Students understand the principles, theories, and methods of modern science, the relationship between science and technology, the implications of scientific discoveries and the potential of science and technology to address problems of the contemporary world.

Expected Learning Outcomes

1. Students understand the basic facts, principles, theories and methods of modern science.
2. Students understand key events in the development of science and recognize that science is an evolving body of knowledge.
3. Students describe the inter-dependence of scientific and technological developments.
4. Students recognize social and philosophical implications of scientific discoveries and understand the potential of science and technology to address problems of the contemporary world.

GEC COURSE ASSESSMENT PLAN AND REPORT FOR
EARTHSCI 2204: Exploring Water Issues

February 13, 2018
Prepared by Motomu Ibaraki for The School of Earth Sciences

I. ABSTRACT

This document details the assessment plan for EarthSci 2204: Exploring Water Issues. Course goals and objectives for EarthSci 2204 were examined to align them more closely with GEC goals and objectives (Appendix A). During Fall 2018, direct testing with embedded questions (Appendix B) will be implemented across all two sections of EarthSci 2204 to assess whether learning objectives are being met. Faculty will meet in 2019 to assess ways to improve student learning and to reassess the evaluation method. Evaluation will be repeated yearly. In future, methods for assessing the lab sections will be developed as well.

II. COURSE DESCRIPTION

EarthSci 2204, Exploring Water Issues, meets the University's Natural Science GEC requirement for undergraduates. This course introduces basic concepts controlling the movement of surface water and ground water, the distribution of water resources, the ways in which these resources can be exploited and/or contaminated, and examine critical issues concerned with the use of water in the United States and countries around the world. The course bulletin accurately describes EarthSci 2204 as: "Water on Earth, human impacts, and scientific and technological issues related to water resource development and conservation."

The syllabus for this course (section IV) includes a goals statement for GEC Natural Science courses and lists core learning objectives for EarthSci 2204, which describe how this course meets the GEC goals and objectives for this category. Two regular sections of this course are taught each year for a total of ~120 students per year. The lecture sections are taught by regular faculty in the department. The chair of the graduate committee, Dr. Steven Lower, oversees collection of Faculty lecture sections are evaluated with standard SEIs.

III. LEARNING OUTCOMES ASSESSMENT PLAN

- A Appendix A outlines both core and specific learning objectives for EarthSci 2204, which are in agreement with the learning goals and objectives of the Natural Science GEC. The method of embedded testing will be used to evaluate whether this course is meeting its objectives. Appendix B gives the 8 multiple choice questions written to test Objectives 1, 2, 3 and 4. Each test question relates directly to a course and GEC learning objective (as indicated by section heading) and to specific subcategories of Earth Science (as indicated in italics below each question) to ensure breadth of coverage. These questions have been approved by the faculty of the School of Earth Science.
- B Our goal in this assessment is that 75% of students give the correct answer for the embedded multiple-choice test questions, averaged across all sections. Questions for which fewer than 75% of students give a correct answer will be pinpointed as areas of weakness.
- C Assessment will be implemented during Fall 2018, and in each subsequent Fall Quarter, even after assessment goals have been met. The faculty instructors for two lecture sections, encompassing up to 120 students, will incorporate the embedded questions into the multiple choice component of exams they are already administering. As exam dates and content will be determined by the individual faculty, it will also be left to them to decide when and in what order each question appears in each exam. Students will not be informed that these questions are different in any way. Data for each question will be forwarded to Dr. Ibaraki and combined anonymously. Each question will be evaluated against the metric for success described above.
- D If results are not satisfactory of any of the 8 embedded test questions, Dr. Ibaraki will organize a meeting during the winter or spring of 2019 with faculty to plan, as a group, ways to adjust delivery methods to improve student learning or to decide whether the test questions instead need to be adjusted in terms of scope, subject or wording.
- E The embedded test question procedure will be repeated every Fall Quarter to test for improvement and ensure that the course continues to meet GEC goals and learning objectives. We will also explore ways to assess the labs in future faculty and GTA meetings.

GE Expected Learning Outcomes	Methods of Assessment *Direct methods are required. Additional indirect methods are encouraged.	Level of student achievement expected for the GE ELO. (for example, define percentage of students achieving a specified level on a scoring rubric)	What is the process that will be used to review the data and potentially change the course to improve student learning of GE ELOs?
<u>ELO 1</u> Students understand the basic facts, principles, theories and methods of modern science.	Standardized questions 1-2, attached	75% of students give the correct answer for the embedded multiple-choice test questions, averaged across all sections.	Standardized questions for which fewer than 75% of students give a correct answer will be pinpointed as areas of weakness. To address weaknesses, an <i>ad hoc</i> committee of EarthSci 2204 instructors will be formed to analyze instructional materials and propose changes.
<u>ELO 2</u> Students understand key events in the development of science and recognize that science is an evolving body of knowledge.	Standardized questions 3 -4	75% of students give the correct answer for the embedded multiple-choice test questions, averaged across all sections.	
<u>ELO 3</u> Students describe the inter-dependence of scientific and technological developments.	Standardized questions 5-6	75% of students give the correct answer for the embedded multiple-choice test questions, averaged across all sections.	
<u>ELO 4</u> Students recognize social and philosophical implications of scientific discoveries and understand the potential of science and technology to address problems of the contemporary world.	Standardized question 7-8	75% of students give the correct answer for the embedded multiple-choice test questions, averaged across all sections.	

IV. SYLLABUS:

Syllabus: Earth Sci 2204

Exploring Water Issues FALL 2018

V. Course overview

Instructor

Instructor: Motomu Ibaraki

Email address: ibaraki.1@osu.edu

Phone number: 614-292-7528

Office: ML 0229

Office hours

(in person): please access <http://ibaraki.youcanbook.me> to book an appointment; (online): carmen connect

<http://carmenconnect.osu.edu/ibaraki-office-hour/>

Public Health Specialization Competencies

Please review the BSPH core and specialization competencies addressed by this course at the following link:

<http://cph.osu.edu/students/undergraduate>

Course description

Introduction to issues affecting the world's fresh water supply with an emphasis on water use, conflict and sustainability. Lectures are given through a mixture of ways including recordings, videos, and pdfs (lecture slides).

Course objectives

The objectives of this course are:

1. to introduce basic concepts controlling the movement of surface water and ground water, the distribution of water resources, the ways in which these resources can be exploited and/or contaminated, and
2. to examine critical issues concerned with the use of water in the United States and countries around the world

GE Category and Expected learning outcomes

This course fulfills GE Category Natural Science, Physical Science. Natural Science coursework enables students to understand the principles, theories, and methods of modern science, the relationship between science and technology, the implications of scientific discoveries and the potential of science and technology to address problems of the contemporary world.

1. Students understand the basic facts, principles, theories and methods of modern science.
2. Students learn key events in the development of science and recognize that science is an evolving body of knowledge.
3. Students describe the inter-dependence of scientific and technological developments.
4. Students recognize social and philosophical implications of scientific discoveries and understand the potential of science and technology to address problems of the contemporary world.

Course materials

Optional materials

Cech, T.V, 2002. Principles of Water Resources: History, Development, Management, and Policy, Wiley Text Books, p480. (ISBN: 0471438618) (print)

Hornberger, G. M. J.P. Raffensperger, P.L. Wiberg, and K.N. Eshleman, 1998. Elements of Physical Hydrology: Johns Hopkins University Press, Baltimore, Maryland, 314 p. (print)

Clarke, R. and J. King, 2004. The water atlas, New Press, p127. (ISBN: 1565849078) (print)

Course technology

For help with your password, university e-mail, Carmen, or any other technology issues, questions, or requests, contact the OSU IT Service Desk. Standard support hours are available at <https://ocio.osu.edu/help/hours>, and support for urgent issues is available 24x7.

- **Self-Service and Chat support:** <http://ocio.osu.edu/selfservice>
- **Phone:** 614-688-HELP (4357)

- **Email:** 8help@osu.edu
- **TDD:** 614-688-8743
 - Baseline technical skills necessary for online courses
- Basic computer and web-browsing skills
- Navigating Carmen
 - Technology skills necessary for this specific course
- CarmenConnect text, audio, and video chat
- Collaborating in CarmenWiki
- Recording a slide presentation with audio narration
- Recording, editing, and uploading video
 - Necessary equipment
- Computer: current Mac (OS X) or PC (Windows 7+) with high-speed internet connection
- Webcam: built-in or external webcam, fully installed
- Microphone: built-in laptop or tablet mic or external microphone
 - Necessary software
- Microsoft Office 365 ProPlus All Ohio State students are now eligible for free Microsoft Office 365 ProPlus through Microsoft's Student Advantage program. Each student can install Office on five PCs or Macs, five tablets (Windows, iPad® and Android™) and five phones.
 - Students are able to access Word, Excel, PowerPoint, Outlook and other programs, depending on platform. Users will also receive 1 TB of OneDrive for Business storage.
 - Office 365 is installed within your BuckeyeMail account. Full instructions for downloading and installation can be found <https://ocio.osu.edu/kb04733>.

VI. Grading and faculty response

Grades

Assignment or category	Points
Two midterms (80 min, multiple-choices, calculations, and short answers)	40
Final exam (80 min, multiple-choices, calculations, and short answers)	20
Assignments (calculations, and short answers)	15
Individual presentation (Powerpoint slide w/o audio)	10
14 timed quizzes (30 min, 15 questions)	15
Total	100

Exams cover material presented in class, assignments, media presentations, and any other material covered in class.

See course schedule, below, for due dates

Late Submission Policies

All graded assignments are due on the specified due date. No emailed assignments will be accepted. All assignments turned in after the due date will incur a 10% penalty for each day late, up to a week late. After that no points will be awarded to the assignment. If a doctor's excuse for illness or excuse for a university-sanctioned

event is provided accommodations will be made. Make-up assignments and exams will not be given unless a valid excuse is provided.

Grading scale

Grade		Percent	
A	93	-	100
A-	90	-	92
B+	87	-	89
B	83	-	86
B-	80	-	82
C+	77	-	79
C	73	-	76
C-	70	-	72
D+	67	-	69
D	60	-	66
E		59 and below	

Faculty feedback and response time

I am providing the following list to give you an idea of my intended availability throughout the course. (Remember that you can call **614-688-HELP** at any time if you have a technical problem.)

Grading and feedback

For large weekly assignments, you can generally expect feedback within **7 days**.

E-mail

I will reply to e-mails within **24 hours on school days**.

Discussion board

I will check and reply to messages in the discussion boards every **24 hours on school days**.

VII. Attendance, participation, and discussions

Student participation requirements

Because this is a distance-education course, your attendance is based on your online activity and participation. The following is a summary of everyone's expected participation:

- **Logging in: AT LEAST ONCE PER WEEK**
Be sure you are logging in to the course in Carmen each week, including weeks with holidays or weeks with minimal online course activity. (During most weeks you will probably log in many times.) If you have a situation that might cause you to miss an entire week of class, discuss it with me *as soon as possible*.
- **Office hours and live sessions: OPTIONAL OR FLEXIBLE**
All live, scheduled events for the course, including my office hours, are optional. If you are required to discuss an assignment with me, please contact me at the beginning of the week if you need a time outside my scheduled office hours.
- **Participating in discussion forums: 4+ TIMES PER WEEK**
As participation, each week you can expect to post at least four times as part of our substantive class discussion on the week's topics.

Discussion and communication guidelines

The following are my expectations for how we should communicate as a class. Above all, please remember to be respectful and thoughtful.

- **Writing style:** While there is no need to participate in class discussions as if you were writing a research paper, you should remember to write using good grammar, spelling, and punctuation. Informality (including an occasional emoticon) is fine for non-academic topics.

- **Tone and civility:** Let's maintain a supportive learning community where everyone feels safe and where people can disagree amicably. Remember that sarcasm doesn't always come across online.
- **Citing your sources:** When we have academic discussions, please cite your sources to back up what you say. (For the textbook or other course materials, list at least the title and page numbers. For online sources, include a link.)
- **Backing up your work:** Consider composing your academic posts in a word processor, where you can save your work, and then copying into the Carmen discussion.

VIII. Other course policies

Academic integrity policy

Policies for this online course

- **Quizzes and exams:** You must complete the midterm and final exams yourself, without any external help or communication. Weekly quizzes are included as self-checks.
- **Written assignments:** Your written assignments, including discussion posts, should be your own original work. In formal assignments, you should follow **MLA** style to cite the ideas and words of your research sources. You are encouraged to ask a trusted person to proofread your assignments before you turn them in--but no one else should revise or rewrite your work.
- **Reusing past work:** In general, you are prohibited in university courses from turning in work from a past class to your current class, even if you modify it. If you want to build on past research or revisit a topic you've explored in previous courses, please discuss the situation with me.
- **Falsifying research or results:** All research you will conduct in this course is intended to be a learning experience; you should never feel tempted to make your results or your library research look more successful than it was.
- **Collaboration and informal peer-review:** The course includes many opportunities for formal collaboration with your classmates. While study groups and peer-review of major written projects is encouraged, remember that comparing answers on a quiz or assignment is not permitted. If you're unsure about a particular situation, please feel free just to ask ahead of time.

Ohio State's academic integrity policy

Academic integrity is essential to maintaining an environment that fosters excellence in teaching, research, and other educational and scholarly activities. Thus, The Ohio State University and the Committee on Academic Misconduct (COAM) expect that all students have read and understand the University's *Code of Student Conduct*, and that all students will complete all academic and scholarly assignments with fairness and honesty. Students must recognize that failure to follow the rules and guidelines established in the University's *Code of Student Conduct* and this syllabus may constitute "Academic Misconduct."

The Ohio State University's *Code of Student Conduct* (Section 3335-23-04) defines academic misconduct as: "Any activity that tends to compromise the academic integrity of the University, or subvert the educational process." Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination. Ignorance of the University's *Code of Student Conduct* is never considered an "excuse" for academic misconduct, so I recommend that you review the *Code of Student Conduct* and, specifically, the sections dealing with academic misconduct.

If I suspect that a student has committed academic misconduct in this course, I am obligated by University Rules to report my suspicions to the Committee on Academic Misconduct. If COAM determines that you have violated the University's *Code of Student Conduct* (i.e., committed academic misconduct), the sanctions for the misconduct could include a failing grade in this course and suspension or dismissal from the University.

If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact me.

Other sources of information on academic misconduct (integrity) to which you can refer include:

- The Committee on Academic Misconduct web pages ([COAM Home](#))
- *Ten Suggestions for Preserving Academic Integrity* ([Ten Suggestions](#))
- *Eight Cardinal Rules of Academic Integrity* (www.northwestern.edu/uacc/8cards.htm)

Copyright disclaimer

The materials used in connection with this course may be subject to copyright protection and are only for the use of students officially enrolled in the course for the educational purposes associated with the course. Copyright law must be considered before copying, retaining, or disseminating materials outside of the course.

Trigger warning

Some contents of this course may involve media that may be triggering to some students due to descriptions of and/or scenes depicting acts of violence, acts of war, or sexual violence and its aftermath. If needed, please take care of yourself while watching/reading this material (leaving classroom to take a water/bathroom break, debriefing with a friend, contacting a Sexual Violence Support Coordinator at 614-292-1111, or Counseling and Consultation Services at 614-292-5766, and contacting the instructor if needed). Expectations are that we all will be respectful of our classmates while consuming this media and that we will create a safe space for each other. Failure to show respect to each other may result in dismissal from the class.

Statement on title IX

Title IX makes it clear that violence and harassment based on sex and gender are Civil Rights offenses subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories (e.g., race). If you or someone you know has been sexually harassed or assaulted, you may find the appropriate resources at <http://titleix.osu.edu> or by contacting the Ohio State Title IX Coordinator, Kellie Brennan, at titleix@osu.edu

Accessibility accommodations for students with disabilities

Requesting accommodations

Students with disabilities (including mental health, chronic or temporary medical conditions) that have been certified by the Office of Student Life Disability Services will be appropriately accommodated and should inform the instructor as soon as possible of their needs. The Office of Student Life Disability Services is located in 098 Baker Hall, 113 W. 12th Avenue; telephone 614- 292-3307, slds@osu.edu; slds.osu.edu

Accessibility of course technology

This online course requires use of Carmen (Ohio State's learning management system) and other online communication and multimedia tools. If you need additional services to use these technologies, please request accommodations with your instructor.

- Carmen (Canvas) accessibility
- Streaming audio and video
- Synchronous course tools

Your mental health!

A recent American College Health Survey found stress, sleep problems, anxiety, depression, interpersonal concerns, death of a significant other and alcohol use among the top ten health impediments to academic performance. Students experiencing personal problems or situational crises during the quarter are encouraged to contact the College of Pharmacy Office of Student Services in room 150 Parks Hall (614-292-5001) OR OSU Counseling and Consultation Services (614-292-5766) for assistance, support and advocacy. This service is free and confidential.

Academic Support Services

Student Services

For other academic matters the Student Service Center <http://ssc.osu.edu/> can help with a range of issues related to paying tuition and fees, track financial aid, register for classes, view your grades, get important updates and much more.

Student Academic Services

Undergraduate academic advising at Ohio State (Columbus campus) is provided by the colleges and/or the departments that offer the programs—the degree(s), the major(s), the minor(s)—a student is pursuing. Therefore, where a student should go to seek academic advice will vary by student and by academic program. The details of the student academic services offered on the OSU main campus can be found at <http://advising.osu.edu/welcome.shtml>.

IX. Course schedule (tentative)

Week	Dates	Topics, Readings, Assignments, Deadlines
1	8/21 – 8/24	Course Introduction – Exploring Water Issues Quiz

Week	Dates	Topics, Readings, Assignments, Deadlines
2	8/27 – 8/31	Water Cycle Quiz
3	9/3 – 9/7	Crisis in the World Water Supply - Decline of the Aral Sea Assignment 1: due 9/10 Quiz Discussion board post: Aral sea
4	9/10 – 9/14	Ground Water – Introduction Quiz Midterm 1
5	9/17 – 9/21	Water Wells and Pumping Impacts Quiz
6	9/24 – 9/28	When Rivers Run Dry Assignment 2: due 10/1 Quiz Discussion board post: Colorado River problems
7	10/1 – 10/5	Evapotranspiration and Water Budget - High Plains Aquifer Quiz
8	10/8 – 10/12	Unsustainable agribusiness and Grandprairie Demonstration Project in Arkansas Individual presentation: due 10/15 Discussion board post: Grandprairie Demonstration Project (Autumn Break)
9	10/15 – 10/19	Floods - Examples from USA and Around the World Assignment 3: due 10/22 Quiz
10	10/22 – 10/26	Introduction to Water Pollution Quiz Midterm 2
11	10/29 – 11/2	Issues in Water Pollution – Movie “Civil Action” Quiz Discussion board post: Civil Action
12	11/5 – 11/9	Issues in Water Pollution – Energy and Shale Gas Quiz Assignment 4: due 11/12
13	11/12 – 11/16	Water and Health - Arsenic poisoning in Bangladesh

Week	Dates	Topics, Readings, Assignments, Deadlines
		Quiz Discussion board post: Bangladesh arsenic problem
14	11/19 – 11/23	Impacts of Climate Change (Thanksgiving Break)
15	11/26 – 11/30	Impacts of Climate Change, Water Business Quiz
16	12/3 – 12/5	Water Business Quiz 1 day

APPENDIX A: COURSE GOALS AND LEARNING OBJECTIVES

EARTHSCI 2204: Exploring Water Issues

COURSE GOALS: This course introduces basic concepts controlling the movement of surface water and ground water, the distribution of water resources, the ways in which these resources can be exploited and/or contaminated, and examine critical issues concerned with the use of water in the United States and countries around the world. This course fulfills the learning objectives of the GEC Natural Science requirement for students.

LEARNING OBJECTIVE 1:

Students explain and recall basic concepts controlling the movement of surface water and ground water, the distribution of water resources, the ways in which these resources can be exploited and/or contaminated. This fulfills the first and third objectives of the GEC Natural Science requirement: (1) Students understand the basic facts, principles, theories and methods of modern science, and (3) students provide examples of the inter-dependence of scientific and technological developments.

LEARNING OBJECTIVE 2:

Students will examine critical issues concerned with the use of water in the United States and countries around the world.

This fulfills the second and fourth objectives of the GEC Natural Science requirement: (2) Students learn key events in the history of science, and (4) students discuss social and philosophical implications of scientific discoveries and understand the potential of science and technology to address problems of the contemporary world.

APPENDIX B: EMBEDDED TEST QUESTIONS
EARTHSCI 2204: Exploring Water Issues

Embedded Questions: multiple choice questions that test GEC objectives to be included in exams (correct answers shown in bold)

LEARNING OBJECTIVE 1: students understand the basic facts, principles, theories and methods of modern science.

1. Approximately what percent of water on the planet is contained in the oceans? (*Question addresses water resources*)
 - (a) 36%
 - (b) 54%
 - (c) 70%
 - (d) **97 %**
2. Which of the following represents the largest volume of water: (*Question addresses the hydrologic cycle*)
 - (a) the amount of surface water transported from the ocean to the continents
 - (b) the amount of evapotranspiration into the atmosphere
 - (c) **the amount of evaporation from the ocean**
 - (d) the amount of water evaporated from lakes

LEARNING OBJECTIVE 2: Students learn key events in the history of science.

3. The success of the Garamantes was based on their subterranean water-extraction system, a network of tunnels known as: (*Question addresses the relationship between the Gramantes empire and water resources*)
 - (a) **foggaras**
 - (b) qudao
 - (c) kakuriz
 - (d) yousuuro
4. The decline of the Garamantian culture may have been connected to: (*Question addresses the relationship between the Gramantes empire and water resources*)
 - (a) climate change
 - (b) **overuse of groundwater**
 - (c) overuse of surface water
 - (d) enviromental disasters

LEARNING OBJECTIVE 3: Students provide examples of the interdependence of scientific and technological developments

5. At a gaging station, the _____(i)_____ hydrograph is obtained. A ___(ii)_____ shows a relationship between stage and discharge used to convert continuous measurements of stream depth to a _____(iii)_____ hydrograph. (*Question addresses water dynamics in rivers and measurement technology*)
 - (a) **(i) stage, (ii) rating curve, (iii) discharge**
 - (b) (i) discharge, (ii) rating curve, (iii) stage
 - (c) (i) discharge, (ii) logical diagram, (iii) stage
 - (d) (i) stage, (ii) Bernoulli curve, (iii) discharge
6. Discharge in a stream: (*Question addresses water dynamics in rivers and measurement technology*)
 - (a) is measured at different stages to establish a Bernoulli curve.
 - (b) is recorded continuously at stream gaging stations.
 - (c) **is measured using a current meter.**
 - (d) is measured using a piezometer.

LEARNING OBJECTIVE 4: Students discuss social and philosophical implications of scientific discoveries and understand the potential of science and technology to address problems of the contemporary world.

7. What similarities exist between the Garamantes and modern examples of the big cities in Southwestern US? *(Question addresses scientific understanding of historical and current water-related cases. This also addresses objective 2.)*
- (a) **overuse of water**
 - (b) climate
 - (c) economic development
 - (d) evapotranspiration rate
8. The origin of arsenic in groundwater in Bangladesh which cause the world largest mass poisoning is. *(Question addresses mass poisoning in Bangladesh and potential remedies)*
- (a) a discharge from a city
 - (b) a discharge from industrial sites
 - (c) **a naturally-occurring source**
 - (d) none of the above